SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

COLLIERIES IN NORTH DURHAM, THEIR WORKINGS AND MACHINERY—No. X.

The Lambton Collieries, the property of the Earl of Durham, comprise Houghton and Newbottle, Littletown and Sherburn, Lumley H. T. Morton. That section of the collieries (the Houghton and and Brasside Collieries, the Earl of Durham's chief manager being Mr. Newbottle) we are going to describe is under the viewership of Mr. W. Lishman.

Houghton Colliery.—Originally one pit, 14 ft. in diameter, was put down to the Hutton seam, 130 fms. in depth; the sinking commenced in the year 1827, and coal work in the year 1831. The Magnesian Limestone formation, which at Houghton Hill forms a bold eminence, is probably not less than 180 ft. in thickness; underneath this is the New Red Sandstone, which is here of a friable nature, but at Newbottle this sandstone is hard and compact, and has been much used for building purposes. The Houghton pit was sunk close to the escarpment of the magnesian limestone; the limestone was thus avoided, but about 20 ft. of sand underlying it was passed through, The original pit has 40 fms. of tubbing inserted continuously in it, the top of which is near the surface. The pit was divided into three equal sections by mitred plank brattice meeting in the centre down to the Low Main seam; the south section was for the pumps, the west one for raising coal from the Hutton seam, and the east one from the Main coal seam, the latter being at first also the upcast; the upcast was subsequently made at the Margaret pit, Newbottle, 1¼ mile distant, thus making the whole of the Houghton pit a passage for the ingress of air. But this arrangement has been greatly altered during the last four or five years. The 48-inch beam pumping-engine, and two 45-fm. lifts of pumps, with the whole of the brattice, has been removed, the pit being now divided by buntons into two parts; the west side only is in use at present. Another pit has been sunk 90 yards north from the old pit, completed three years ago, also to the Hutton seam, and 14 ft. in diameter; this is now the upcast and ventilating agent for the whole of the Houghton mines: 40 fathoms of cast-iron tubbing is inserted continuously in this pit; this is cased inside with fire-brick, so as to protect it from the water and vapours in the shaft. The pit above and below the tubbing is also cased with fire-brick, 8 inches in the bed. The tubbing is inserted at the coal measures, the water being probably derived from the surface through faults and fissures in the strata. We proceed now to describe the arrangements as they exist at present. The east winding-engine has a 32½-inch cylinder, 6-ft. stroke, non-condensing, cast-iron levers, 14-ft. flat-rope drums, and fly-wheel; the latter rest on one side of the house, and an intermediate ashlar wall. A staple for counterbalance weights is sunk at the back of the house. This engine raises about 450 tons of Hutton seam per day from the Low Main level, with three-decked cages, three 8-cwt. tubs in each cage, also changes the men and boys for both pits. Each cage runs on two flanged rails at one side of it; these rails are fixed in wrought-iron sleepers; one of the latter is fastened to each bunton. The engine is intended to raise Main coal in the east division of the pit from the level of a new drift now in course of formation, 77 fms. in depth, with two-decked cages, four 8-cwt. tubs in each cage, these running on two rails, as in the west division. The west winding-engine has a 36-inch cylinder, 6-ft. stroke, 15-ft. flat-rope drums, cast-iron levers, and condensing apparatus; this engine is but little used at present; it is designed to be applied to the existing cages on the west side in raising coal from the deep Hutton seam, 130 fms. deep. The new, or north pit winding-engine, placed between the pits, made by Black, Hawthorn, and Co., 1867, has two 34-inch horizontal cylinders, covered with felt and cleading, 6-ft. stroke, direct-acting; piston valves worked by four eccentrics and slot links; compensating drum 16 ft. in diameter at middle, and 18 ft. at the sides. This engine raises about 1050 tons of Hutton seam and Main coal per day in two-decked cages, four 8-cwt. tubs in each cage. Each cage runs on three wire-rope guides; a weight of 2½ tons is attached to each guide. The pits are each fitted with Ormerod's safety-link apparatus for the prevention of overwinding; this has on more than one occasion been the means of preventing serious accidents. The safety-links have been three years in use here, and have never got out of working order in that time.

The water-works engine has 24-in. inverted cylinder, 4-ft. stroke, resting on standards; it pumps from a pit sunk through sand and into the coal measures, a total depth of 200 ft. The engine forces the water to a reservoir on the hill, from which the town of Houghton-le-Spring is supplied by pressure.

A range of eight boilers, near the east winding-engine, supply it, an engine in the Low Main seam, and the water engine with steam at 40 lbs. pressure; the boilers vary in length from 32 to 34 ft., and in diameter from 5 to 6 ft., and are in course of being roofed over; they are fed by the winding-engine. Two boiler feeders have lately been erected; each has an 8-in. inverted cylinder, and 5-in. plunger. The range of seven boilers at the north winding-engine comprises two plain 32 ft. by 6 ft. 4 in, two plain 36 ft. by 5½ ft., and two Lancashire boilers 28 by 7 ft. in shell; these are uncovered, and are fed by the north winding-engine. A boiler-feeder is erected with 10-in. inverted cylinder, and 5-in. plunger. Steam is supplied at 35 lbs. pressure to the west and north winding-engines. The heapstead, framing, seven screens, and inclined elevator at the south pit are all of wood, and part of the original plant. The erections at the north pit are of the most approved kind, from the designs of Mr. Young, the engineer at these collieries. The four pulley-frame legs, struts, and backstays are formed of iron lattice-work; the heapstead flooring and screens are of wrought-iron, supported on cast-iron columns, roofed over with wrought-iron, and enclosed with galvanised iron sheeting. There are ten screens, inclined in contrary directions alternately, five each way. The small coal from the bottom of each row of screens is carried by an endless band to a bucket elevator at each side. The elevators supply one revolving screen, by which the coal is separated as nuts, peas, and duff. This machinery is put in motion by a 12-in. horizontal engine, with 18-in. stroke, by means of shafting and bevel wheels.

Underground Workings.—Only the Main coal and Hutton seams are at present worked, all coal being raised in both pits from the Low Main level. In the Main coal seam a self-acting incline on the endless-chain principle is in operation, but a new hauling engine just completed will be used as a substitute for this and a great many horses employed in this seam. In the Hutton seam an engine plane is in operation, the engine itself being placed near the pit in the Low Main seam. In order fully to understand the underground arrangements, it will be necessary to explain that there are several extensive dislocations of the strata which have been encountered in the process of winning out; most of the faults run in an east and west direction. On the south of the old pit the measures are thrown up to south by a rise fault of 20 fathoms. A fault downthrow 20 ft. to east occurs on the east of the pits. A fault downthrow north 15 fms. occurs 400 yards north of pits, another rise to north of 25 fms., 800 yards north of pits, and another rise to north of 10 fms. occurs at 950 yards north from pits. Accordingly the Hutton seam is regained on the south side of the 20 fms. fault by making the entrance to that mine and hanging on in the Low Main seam, which is 14 fms. above the Hutton seam. By a rise stone drift intersecting the fault the Hutton seam is thus conveniently approached. The Hutton seam is also raised up to the Low Main from between the 20 and 25 fathom faults by a staple near the old pit, and an engine at the top of the staple, which has a 14-in. horizontal cylinder, 2-ft. stroke, and direct-acting; it raises coal in single-tub cages from the respective depths of 14 and 17½ fms. by drums of corresponding circumference; the difference of depth represents the size of the east fault, before referred to. Water is now raised from the Low Main seam to the surface by the north winding-engine at night, in tanks holding 330 gallons each, placed in the cages.

The Hutton Seam Hauling-Engine is placed about 20 yards south of the old pit by the roadside with drums over the road. It has two 18-in. diagonal cylinders, 4-ft. stroke, working direct to the end of the main shaft; the tail drum, 6 ft. in diameter, is on this shaft, and is put in or out of gear by a clutch; the main rope, 6 ft. in diameter, is on a separate shaft, connected with the main shaft by wheels in ratio of 1 to 2; this drum is moved by slide carriage. The engine has been 18 years erected. It hauls about 700 tons of coal daily a length of two miles, 75 tubs in each set. The first portion of the plane, south 12° east, is nearly level, 900 yards in length, the second portion is south 53° east of equal length; the plane to the end of this length is worked by main and tail ropes. The remainder, one mile, is east, with a dip inwards of ¾ in. per yard, for which the main rope only is required. The rope is steel wire, 2½-in. circumference. At the end of the first 900 yds. a pump is fixed by which water is forced up to the pit; the pump is worked at nights only, and is driven from the tail rope by turning it over two 4½-ft. sheaves, and half round a 6-ft. wheel fixed below them, from the cranked shaft of which a vertical pump is worked direct; it has a 6-in. double-acting plunger, 2-ft. stroke and 6-in. main pipes. At the distance of 350 yards outbye from the last another pump is fixed of the same size, and driven by similar means at nights only; the main pipes from this with which those from the first pump unite are 7 inches in diameter up to the pit.

The Main Coal Seam.—The endless chain system of hauling has been one and a half years in operation on a length of 750 yards, with a ⅝-in. chain. The Main coal south of the 20-fathoms fault is regained by a stone drift to the south of 230 yards, commencing near the old pit in the Main coal, rising south 6 in. per yard. Beyond this is a length of 520 yards southward, with an average dip inward of 1¼ in. per yard, where the return 4-ft. clip-wheel is fixed. The gravity of the full tubs on the first length is sufficient to draw the empty ones up to the crown, and also haul the tubs each way on the 520 yards length: 104 tubs are in motion together, 14 yards apart—that is, 52 on the full and 52 on the empty road. By placing the tubs nearer together a quicker motion may be given to the chain. At the bottom of the 6-in. bank the Main coal is dropped down to the Low Main seam by a staple 24 fms. in depth. As the road on the endless-chain principle is not capable of much further extension southward, an engine-road is being prepared for a length of 1½ mile from the pit. A drift has been driven from the crown direct to the old pit, and nearly level, from which point the Main coal will ultimately be raised (from 77 fms.) The engine-road will also be extended inwards, westward, and then southward, to the extreme workings. The hauling-engine for this road is nearly completed, being placed 30 yards north of the pit, in line with the plane. It has two 24-in. horizontal cylinders, placed 14 ft. apart, 4-ft. stroke, wheels in ratio of 1 to 2, two 8-ft. drums on one shaft, with clutch between. A receiver is placed at the back of the engine: 12-in. steam-pipes are brought down the upcast, from which 8-in. pipes branch off to this engine, and similar pipes to that in the Low Main seam. The escape steam is conveyed away in pipes to the bottom of the upcast pit.

Sections of the workable beds of coal as found in this property:—

		Thickness.
1.—Five-quarter Seam, good steam coal		3 ft. 3 in.
2.—Main Coal Seam..	Top coal	1 ft. 2 in.—Often left as roof.
	Best coal	5 0
	Coarse coal.....	0 9= 6 ft. 11 in.
	Good fire-clay.....	1 10
3.—Maudlin Seam ..	Top coal	0 ft. 8 in.
	Good coal	2 4
	Splint	0 2½
	Good coal.....	1 2=4 ft. 4½ in.
	Fire-clay, inferior.	
4.—Low Main Seam..	Steam coal	4 3 including 3 in. of splint.
5.—Hutton Seam	Good house coal	4 ft. 0 in.
	Shale band varies from ..	0 2 to several feet.
	Coarse bottom coal	1 2

Below this the coal measures are as yet unproved. In the aggregate thickness of 22½ ft. of coal ascertained to exist there is a large proportion yet remaining to work. Nos. 1, 3, and 4 seams are comparatively little worked, and will, probably, remain so until the superior coals are to a great extent exhausted.

Coal is worked both in the Main and Hutton seams on the bord and pillar system; the pillars in the Main coal are made 30 yards by 18 yds. The pillars in the Hutton seam have been made 20 yds. by 18 yds., bords 4 yds., walls 2 yds. width, they are now being made 44 by 33 yards in length. The dip of the measures generally is eastward about 1 in. per yard. The cleavage is nearly north and south; bords are driven in a direction at right angles, usually west. Safety-lamps are used solely in the workings of both seams, of which 188 are Stephenson lamps, for pillar working and in the waste; 112 are Davy lamps, covered with glass and tin, also locked, and used by drivers and putters; and 392 are Davy lamps, for whole working: total, 692 lamps. Powder is used in the whole working—none in pillar working. Shots are fired by authorised men, who perform this work only when a complete examination of each place shows that the firing may be done with safety. Gas is brought to the bottom of the pits by pressure. A large number of gaslights are placed some distance along the main roads from the pits, in the engine-houses, &c. The total persons employed above and underground at Houghton Colliery is 855, of which 667 are men, 350 of these hewers, and 188 boys. Besides the engine and endless-chain systems there are 19 horses, 39 half-size horses, and 60 small ponies, employed in the conveyance of coal underground. The ventilating agent is the upcast pit, heated by two furnaces in the Low Main seam, at 120 fathoms depth, each furnace is 9 ft. wide, 12 ft. in length, fired both in front and at one side. The air in circulation is 150,000 cubic feet per minute, with 1·8 inch of water-gauge. Each panel of bords has a portion of air assigned to it. The return air-ways, though difficult to uphold of proper size, are usually kept at 40 feet sectional area for branch returns, and in the main returns, of 50 ft. area in each of three air-ways.

THE IRONWORKS OF YORKSHIRE—Sir J. BROWN AND COMPANY'S ARMOUR-PLATES, &c.

THE LARGEST FINISHED IRONWORKS IN THE WORLD.

Such are the vast series of buildings in which pig-iron is made into rails and plates, or converted into Bessemer steel, known as the Atlas Works, Sheffield. They now belong to a limited company, Sir John Brown being the presiding genius, associated with him being a most efficient staff of practical men, conversant with all branches of the iron and steel trades. Renowned as Sheffield has been for many centuries past for its cutlery productions, its reputation during the last 12 or 14 years has been still further advanced by the mighty plates it has sent away—heavy armour-plates, alike adapted for shore defences or for fighting ships, and built with a view to withstanding the greatest efforts of modern artillery to penetrate. In addition to plates, there are large quantities of rails, tyres, axles, and of almost every description of manufactured iron made at the works, as well as a great deal of Bessemer steel. The Atlas Works are in two parts, being divided by the Midland Railway. In the various branches there are about 4000 persons employed, each department having well-qualified managers to superintend the works.

Accompanied by a gentleman who formerly belonged to the establishment, and who is also a shareholder, we visited the famed works a day or two since, and enjoyed a treat of no ordinary character. There is a frontage to the street behind which the works are situate of rather more than ¼ mile in length; and on entering we were ushered into an elegant and light suite of offices, so constructed that, despite the divisions, there is an uninterrupted view from one end to the other, having on one side of them lavatories, &c. At the extreme end is a school-room, for education has been well fostered and promoted by Sir J. Brown and his partners, and they have from time to time been liberal contributors to schools and religious buildings. On getting into the main yard everything bespoke the extensive character of the works, and its huge business proportions. In various places were great piles of pig-iron, shattered plates—broken, crushed, and with shot and shell sticking in them; massive plates, tyres, rails, and steel and other shot. Passing along the buildings we saw long rows of boilers, ranges of fiery furnaces filled with molten metal, whilst, hurrying along, workmen were conveying the red-hot metal to ponderous steam-hammers, or to the plate and rail mills, where they were soon converted into the required material.

One of the most interesting processes to be seen is that of rolling the heavy armour-plates, and the skill shown by the men in manipulating the metal, then picking it up, and conveying the vast mass under the rollers. There are two plate mills, the principal one being a 32½-in. train, and will roll a plate 10 ft. 6 in., and up to 15 inches in thickness. The power of the rollers in compressing such a vast weight of metal can scarcely be realised. In connection with the plate mill, which is driven by an engine of something approaching 400-horse power, there are the usual furnaces, cranes, and other necessary appliances, together with powerful planing machines. There was a considerable number of plates of different thicknesses, some of them being planed, whilst others were finished, and marked for their destination. Several of them were bent, so as to suit the sides of a ship, and marked for that particular part of the vessel they were intended for, as the different sections are so made and numbered, or otherwise indicated, that there is no difficulty in putting them together. Besides those plates there were others for turret forts, 10 ft. by 8 ft., and 6 in. thick, with port-holes for the cannon. These turrets are so constructed, we were informed by our intelligent and practical guide, that with comparative ease, either by hydraulic or other power, they could show an opposite or different side to shot or shell, as might be desired. We may say that great efforts have been made in producing these "Sheffield carpets," so that they may be found impervious to the heaviest shot or shell, and so far with considerable success. There can be little doubt, however, but what the battle between the heavy armour-plates and shot and ordnance, the most powerful that can be made, will be resumed. The fight will be an exciting one, and in wishing success to the plates, to use an Irishism, we say "more power" to the loser. That the previous fights have been stubborn ones we are reminded as we proceed from one part of the works to another. In the place where are deposited the "dead plates," or, rather, those that have either been irrecoverably wounded, or have had the "happy dispatch" performed in previous encounters, several had fragments of shot or shell adhering to them. In one instance a steel shell had penetrated a 5½-in. plate, going through so far that it came out half way on each side, whilst several were bulged or broken, or otherwise wrecked. We did not, however, see any of the 12 in. or 15 in. plates that had undergone the test of being fired at, and it is questionable whether an 80-lb. shot would have done them any material injury, great as would be the mischief a shot or shell of that weight would do under ordinary circumstances. The question of "plates *versus* shot," however, is one of too great importance to be discussed in a cursory notice like the present one, but when the next great trial of strength takes place we can at least express the wish that "may we be there to see."

The manufacture of shot and shell is also being carried on at the works, and with such accuracy that the deviation is not more than 0·7. Some that we saw were made of crucible steel, and hammered by a process peculiar to Mr. Edwards, the manager of one of the departments, and who was the first, we were informed, to introduce such steel shot ready for the guns. Spherical hollow shells,

upwards of 200 lbs. in weight, have been made, and shot for 68-pounders finished under the hammer.

An extensive business is done in tyres, and their mode of manufacture is rather interesting, as showing with what ease iron or steel can be manipulated and shaped by means of the steam-hammer. A square of metal is taken from the furnace and put under the hammer, and worked until it is quite round, and to about the size required. A punch is then hammered into the centre, and a hole made. It is then taken to the tyre-mill, where the finishing touch is given, the hole got to its proper size, the rim and all completed, a jet of water being forced on to the metal, by which means the scale is got off. We may say that whilst under the hammer a larger punch, the size of the hole, is kept in the metal whilst it is being worked. The steel tyres of the company have a very high reputation, and there is a very good demand for them, in itself a proof of the estimation they are held in.

There are two rail-mills, the principal one being a 24-in. train, of great power. In connection with it there are the usual furnaces and the necessary machinery. About 1000 tons of rails are produced weekly. There is an engine of 250-horse power, and two circular saws, by which both ends of the rail are cut off at the same time. There is also a rail-straightener, and a machine for cutting a number of rails together, and of exactly the same length. The mill is kept fully going, the business doing in rails being good, and from the extension of home and foreign lines is likely to continue so. There are also two steel rolling-mills and a boiler-plate mill, all kept well going. The same is the case with regard to the merchant-mill and the four breaking-down mills.

In addition to the articles already enumerated as being manufactured at the establishment of Messrs. Brown and Co., are springs, buffers, and almost every description of railway material.

The production of Bessemer steel is large, as is the consumption at the works. At present there are six converters, varying from 8 to 15 tons, but that number, it is expected, will shortly be increased. A new place for extending the manufacture of steel is now in course of construction, we were informed, and when completed the make of Bessemer will be equal to something like 2000 tons a week. With the increasing demand for Bessemer rails, and the small royalty, about 2s. 6d. per ton, there can be no doubt but what the extension of the works will be a source of considerable profit to the company, and well repay the outlay, however large it may be. In one part of the works we noticed a number of men busily engaged in putting down a number of new boilers. There were no less than 12 double-flued, by Wood Brothers, of Sheffield, and Hawksley, Wild, and Co.

The consumption of puddled iron, as might be expected, is very large, and there are no less than 84 furnaces of the ordinary character, about the largest number at any one place in South Yorkshire. The heating furnaces are also numerous, and capable of holding a great deal of metal, as must necessarily be the case when the vast weight of the plates made for ship and armour purposes is taken into consideration.

The machinery is of necessity very extensive and varied, there being no less than 97 engines of different sizes and makes, varying from 6-in. cylinders to 44-in., some being equal to 300-horse power. The boilers are also numerous, there being 110 of them of different descriptions, averaging about 30-horse power each. The steam hammers in the different part of the works are in themselves well worth seeing whilst in operation, and it was worth a visit to see how under them the shapeless mass of molten iron was moulded into various symmetrical forms, and got all but ready for sending away for the purposes for which they were intended. There are 38 steam hammers, the power varying from 1 cwt. up to 17 tons. There are also travelling cranes for conveying the metal from one place to another, and all the other appliances required in melting, hammering, and rolling iron, together with hydraulic presses for bending the thick plates intended for the sides and other parts of war ships, or for other purposes. We believe altogether there are about sixteen mills, with tilt and forge hammers, six ball furnaces, and eight or ten metal helves. There are the usual casting and blacksmiths and other shops for doing the work in connection with the leading departments of the establishment, together with a locomotive engine for conveying the material on to and from the Midland Railway. There is also a hydraulic rail tester, of rather singular construction.

At Swinton, about six miles from Sheffield, the company have some ironworks in connection with the principal establishment. There we understand the iron for steel making is prepared, and sent to Sheffield for converting, and where there is likely to be increased activity, owing to the extra quantity of steel that will very shortly be required by the extension of the Bessemer branch of the works.

We have endeavoured as briefly as possible to convey some idea of the vast establishment of Sir J. Brown and Co., the fame of whose plates is as well known in almost every part of the civilised world as they are in England; but of their actual extent, the varied character of the material produced, including the colossal plates, and the weird-like appearance of the workers seen by the glare of the vast masses of red metal, as it sends forth showers of sparks, they must be seen to be fully realised.

The works are, as we stated in the first instance, the largest in the world, so far as regards finished iron, although the Cyclops, perhaps, are not far behind. Both are of great benefit to Sheffield, and it is to be hoped will long enjoy the high and deserved reputation they have so fully and ably earned, and so find work for the thousands that are now dependent on them for employment.

THE NEW COLLIERY STEAM-PUMP.

SIR,—We note that in the description of our Colliery Steam-Pump, which we recently put down at the Broad Oak Colliery, Loughor, in the Supplement to the Journal of Nov. 26, one or two inaccuracies have crept in which we should like to set right.

Mr. Banfield is mentioned as proprietor instead of lessee, and the machine is described as lifting 15,000 gallons of water per hour 670 ft. high. The pump is constructed to raise this quantity 700 feet high through a horizontal distance of 500 yards; it is now lifting the quantity 420 feet. It is intended to drive the slant at Broad Oak much deeper than at present, and to move the steam-pump down the incline as the work progresses, there being, from its compact construction, but little trouble, and no risk in the operation.

HAYWARD TYLER AND CO.

Whitecross-street, London, Feb. 21.

INACCURATE MINING PLANS.

SIR,—In an article in the Journal of Feb. 18 you have made some remarks upon the recurring inundations of collieries from the frequent inaccuracies of old plans, in consequence of the actual position of the old workings, which may contain water, being much nearer to the new drivages than from the plans it is supposed they really are. With your permission I should be glad of space to make a few remarks upon this subject, as it is a matter of increasing importance; and as new winnings are yearly being opened to the deep of former workings, which in many cases have been full of water for several years, there is a possibility of a periodical recurrence of such calamities as those two upon which your comments of last week are based.

Such inaccuracies as those mentioned arise from different causes; some are blameable, and some, perhaps, can scarcely be considered so. There can be no doubt that mining plans are too often left in the hands of mere boys, whose knowledge of correct surveying is of the narrowest description, even if they can be said to possess it all, and from this circumstance frequent and serious loss to the colliery proprietors is known to arise, even when no loss of life results, for few things pay better in connection with mining operations than a good plan. Inaccuracies also occur from the faults of a system, and can scarcely be considered censurable, like the former. By such inaccuracies I mean those which arise from treating the magnetic meridian as an *invariable* line, when, in fact, it is *constantly variable*. If a plan of workings was made with perfect accuracy some six or eight years ago, and the same workings (being full of water) are now being approached from a lower level, and the present workings are being conducted by new surveys made with the magnetic needle, there will be a great divergence between the actual and estimated relative positions of the old and new workings, in consequence of the change which the magnetic meridian has undergone in the interval; and if such change is not taken into consideration, which it seldom or never is under ordinary circumstances, the accumulated error from this cause will account for the accidents which frequently occur, and this will be the case even though the surveys, both the former and the latter, were done with strict accuracy in themselves. The inaccuracy will have been the consequence of the *system*, and not of the actual incapacity of the surveyor.

It may then be asked why such a system is followed, which results in such consequences? And some will say that the magnetic needle should be discarded as the base of the surveying operations. I must, however, assert my conviction, based upon many years experience, that no other method can or will stand in competition with the method of working with the magnetic needle, provided it be done with proper care—using the best instruments, and applying them with intelligent care and skill. No system of working without the needle can compare with it for accuracy to make, and keep up the additions from time to time, a complete plan of the collieries and mines.

What is wanted to ensure accuracy is to treat the magnetic meridian as a constantly *varying* line, and the true meridian only as an *invariable* line. At the Fine Art and Industrial Exhibition, held at Cardiff, in the autumn of last year, I exhibited an improved instrument of my own design, which is completely adapted to this method of surveying. The zero of the instrument corresponds with the *true meridian*, and the needle is set to an adjusting *vernier*, whose zero marks the correct divergence or declination of the magnetic from the true meridian. This "adjusting vernier" is altered (say) every six months to answer to the variation in that time of the magnetic meridian, and thus the two zeros approach each other in the same degree that the two meridians approach each other, and no error from the before-mentioned cause arises. The line upon the plan represents the *true meridian*, and all the readings of the survey are made that line as its zero.

To correct the instrument periodically it is only necessary to have two fixed points upon the property, either in the true meridian or making a known angle with it, and from these points the adjusting vernier can be set without difficulty. If these fixed points are not absolutely correct in their alignment to a couple of minutes it does not affect the accuracy of the plans, for it is the *variation* that is required more than the absolutely correct position of the true meridian, although this is attainable. The setting up of these points upon any property is not difficult. Then, if the margin of the plan, in two columns appropriated to the purpose, shows the dates of the several surveys made, with the magnetic declination for each half-year to which the adjusting vernier was successively set, no inaccuracy need, nor should, occur in the plans that can in any way endanger the lives of the workmen nor the property of the colliery proprietor.

Treforest, Pontypridd, Feb. 20. WILLIAM LINTERN,
Mineral Surveyor, &c.

INDUSTRIAL AND TECHNICAL EDUCATION.

THE CLAIMS OF POOR SCHOLARS.

SIR,—As you kindly permitted me in your number of the 18th to explain what the committee of the National University deem the first steps which should be taken to advance the cause of technical education in Great Britain, I shall esteem it a favour if you will allow me now to state what my own views are upon the subject of scholarships and degrees, without being certain that they are entirely shared by every individual member of the committee; upon all essential points, however, there will be no difference of opinion.

It has lately been stated that the United States Congress has voted no less than 9,000,000 acres of land, which shall be devoted entirely to the promotion of technical education in all its branches; and it may be news to some of your readers to be informed that we have in England estates of much greater value, at all events more readily available, which might be applied to the same purpose. I may also add that the reasons for taking immediate action in the matter are more pressing in the Old than in the New World.

What are the estates referred to? First of all there are the endowed schools, of which there are 820 in England. They owe their origin to different times and a variety of circumstances, principally to the beneficence of private individuals. The earliest, I believe, is the endowed Grammar School of Carlisle, which is said to have been founded by St. Cuthbert in 686, to have been extinguished in 800, and is known to have been re-established soon after the Conquest by William II., and it was reformed by Henry VIII. The Grammar School at Derby was founded by Walter Durdant, Bishop of Lichfield, in 1160, and that at Salisbury by Simon de Grandavo in 1319; and from that time down to the present this class of charities has been constantly increasing, until at the present time there is an annual income of about 227,000*l.* This, let it be remembered, is exclusive of our great universities, which, with your kind permission, shall form the subject of a future letter.

Now, it is, I believe, an undisputed fact that the greater portion of this immense revenue was given originally for the education of "poor scholars." Our wise ancestors—and spite of "modern enlightenment" I maintain that they were wise—took it for granted that *all* people could not receive the same education with profit, and that the best thing that could happen for the community was that the most highly gifted by nature should receive the highest education, to fit them to be the leaders of those less intellectual. It was assumed also that Nature produced her favoured children in every sphere of life, but did not present the same opportunities of culture to all. The rich, having leisure and wealth, had all that could be desired; but the child of genius was often poor, and hence it was a wise and beneficent thing to help him. I might assert without fear of contradiction that nine out of ten of the grammar schools of England were founded with this idea. There was even provision made for their travelling, and on the dissolution of the monasteries the claims of those poor scholars were guarded and enlarged. On looking over the statutes of Peterborough Cathedral the other day, I saw that Henry VIII. ordered the governing body to keep an open table for them. I, as a poor scholar, looked in vain for either food or table, and yet there are large funds in existence which were originally intended for this purpose. The history of England bears ample testimony to the wisdom of our forefathers in this respect. The only Englishman who ever became Pope of Rome was once a poor scholar, Martin Luther was another, and so also was Thomas Cromwell, one of the greatest statesmen that England has ever produced, and I might enumerate scores of others. They have been, indeed, not only the pioneers but the upholders of our nation's greatness.

If we look at the 820 schools which were formed with this object, and enquire what their present state is, we shall find that 50 of them are in abeyance—that is, not teaching at all: 198 of them are turned into mere elementary schools, and when the new School Act comes into working operation their funds will not be required. A few of the others are doing their work well, and those few are taken almost exclusively by the sons of the rich. The truth is we have neglected the poor scholars; their portion has to a large extent been taken from them, and the result is felt in every sphere of the social and political life of England. One of Her Majesty's School Commissioners says:

"Who will deny that England has life and progress? but who will deny also that her course begins to show signs of uncertainty and embarrasment? This is because even an energy like hers cannot exempt her from the obligation of obeying natural laws; and yet she tries to exempt herself from it when she endeavours to meet the requirements of a modern time and of modern society with a civil organisation which is, from the top of it to the bottom, not modern. Transform it she must, unless she means to come at last to the same sentence as the Church of Sardis—'Thou hast a name that thou livest, and art dead.' However, on no part of this immense task of transformation have I now to touch, except on that part which relates to education. But this part, indeed, is the most important of all; and it is the part whose happy accomplishment may render that of all the rest, instead of being troubled and difficult, gradual and easy."—(School Enquiry Commission, 1868.)

The large funds, however, enumerated above constitute only a portion of what ought to be devoted to technical education. The following is taken from a report of the executive committee of the National University, which was lately read at the Mansion House, the Lord Mayor in the chair:—

"In vol. I. of 'The School Enquiry Commission,' published 1868, those charities are enumerated, and they amount, on the whole, to a sum not far short of a quarter of a million per annum. About 120,000*l.* a year is given in charitable doles, whose influence is universally admitted to be bad; about 50,000*l.* a year is given for apprenticeships and advancement in life, nearly the whole of which is, to say the least, expended uselessly. Marriage portions, again, represent a large item, whilst there is an income of 15,000*l.* per annum for the redemption of captives and the relief of prisoners from debt—persons who no longer exist. Those funds ought to be appropriated to secondary education, and a very large amount of them to industrial and technical instruction. Beyond those, there are large sums of money which have been left for charitable purposes, which are misappropriated or lying entirely unused. In his evidence before the Parliamentary Commission, the Rev. William Rogers, M.A., mentioned that 'in the parish of St. Andrews Undershaft there was a sum of 30,000*l.* which they did not know what to do with.'"—(See School Enquiry Commission, vol. v., page 473.)

So much for the sources from which funds may be obtained for founding scholarships for young men of ability. Do you ask if we require it? Your able correspondent "Cumbrian" has written well on the want of special education in those who have the conducting of mines. Let me add an opinion from high authority on engineering:—

"Our engineers have no real scientific instruction, and we let them learn their business, at our expense, by the rule of thumb; but it is a ruinous system of blunder and plunder. A man without the requisite scientific knowledge undertakes to build a difficult bridge; he builds three, which tumble down, and so learns how to build a fourth, which stands; but somebody pays for the three failures. In France or Switzerland he would not have been allowed to build his first bridge till he had satisfied competent persons that he knew how to build it, because abroad they cannot afford our extravagance. The scientific training of the foreign engineer is perfectly right. Take the present cost per mile of the construction of an English railway, and the cost per mile as it was twenty years ago, and the comparison will give you a correct notion of what rule-of-thumb engineering, without special schools and without scientific instruction, has cost the country."—(School Enquiry Commission, vol. vi., p. 629.)

I attribute the whole of this to the fact that our education has been obsolete and pretendedly classical, instead of being practical and scientific. What, then, you will ask, do you suggest? A proper question, requiring a full and definite answer.

What we require is a system of primary education, which is now happily provided for, which shall compel the universal teaching of the children, no matter who or what their parents may be. In those "national" (or whatever name they may be known by) schools there will be a number of pupils who will excel the others, and rise to be monitors, or be otherwise distinguished. All this will be provided for by the public rates. What the funds above referred to will be required for is to provide for the higher education of those superior pupils. Let them pass into secondary schools, with scholarships of from 20*l.* to 50*l.* per annum, and there prosecute the studies which they have so happily began.

I propose by your kind permission, Mr. Editor, to speak of university training and examinations in a future letter; what has been advanced here lies at the very basis of what we require—the funds necessary to establish a rational system of technical and industrial education.—*Storey's-gate, St. James's-park.* JOHN MILL.

LEAD MINING IN SHROPSHIRE.

SIR,—Many old mines in this district are in the act of being resuscitated with new names, and it may be well for parties investing in such undertakings to enquire beforehand where the workmen are to be brought from, and how they are to be housed? The want of house accommodation, even with the present limited number of workmen, is so great that numbers of these men have to walk from three to five miles to and from their daily employment in all kinds of weather, both day and night. This is a real solid grievance the miners have to complain of. No large mine should be without suitable residences for the men, even if the proprietors regard only their own interest, and wish to bind their workmen to them. The bulk of the miners now in this district live in small tenements, with three to nine acres of land attached, and are supposed to occupy their spare time in cultivating the same; they have, therefore, not entirely to depend upon their earnings at the mine for a subsistence.

The system of working is by relays of men every eight hours, for five days in the week, and on Saturdays only one-third of the hands are at work, between the hours of 6 A.M. and 12 noon, and two-thirds of the men are idle from Friday until Monday in each week, consequently the average number of hours worked by each miner per week is 42, from which may be safely deducted five or six for the time occupied in taking luncheon, so that practically they work about 36 or 37 hours per week. From 12 noon on Saturdays until 6 or 7 o'clock on Mondays in each week the engines are pumping water without any men being at work, say 18 hours, exclusive of Sunday. Again, after each monthly pay-day the whole of the men have the next day to themselves as an holiday.

A Bill is now before Parliament for regulating the working of metalliferous and other mines, and amongst some of its provisions I observe boys of the age of 10 years may be allowed to work in mines three days per week until they attain the age of 13, and all boys up to the age of 16 are to be limited to 56 hours work a week, and under no circumstances to be kept in a mine for more than 12 hours at a time, 1½ hours of which to be appropriated by them for rest and food. The Act is clearly not required to restrict the hours of labour in this district. Until the Roman Gravels Mine recently changed hands I believe it was the exceptional practice at that mine to work on Saturday evenings, but now that a more liberal proprietary has to do with it the men are not required to "break the rules of the country." In one instance it is reported the men induced their fellow-workmen to desist working on Saturdays by threats and intimidation.

The men have a right to expect suitable dwelling-houses to be provided sufficiently near their employers' works, and their masters have an equal right to claim and obtain "a fair day's work for a fair day's wages," which I do not believe they now get; and, further, I am of opinion that if the mines are to return dividends the proprietors cannot afford to pay for pumping water 18 hours, exclusive of Sunday, in every week without having men at work under their machinery.

Some of the recently organised mines appear to have a large subscribed capital, and may well spare a little of it for erecting suitable dwelling-houses for their workpeople; and the sooner the hours of labour are regulated, with or without the aid of the Legislature, the better for all concerned. If what I have stated should have the effect of calling the attention of those interested to this important subject I shall be well pleased. A MINE PROPRIETOR.

Bishop's Castle, Salop, Feb. 19.

MINING IN SWEDEN—THE SOLSTAD COPPER MINES.

SIR,—An account of the Solstad Copper Mines may not prove uninteresting to some of your readers. They are situated on the shores of the Baltic, the prevailing rocks of the district are gneiss, mica schist, hornblende schist, and quartz rock, &c. The principal one—Solstad—lies close to the sea, under a ledge of rocks 120 ft. high; the lode is composed of a mass of quartz, in which the copper ore is embedded, sometimes solid, and again disseminated throughout the quartz, from rough to finely-divided grains, till both ore and quartz give place to the gneiss. When the quartz is displaced by the gneiss, and this comes into contact with the quartz lode proper, poverty follows. The direction of the lode north and south, with a slight inclination westerly, the copper ore dips northerly 45°, the most solid being found on the west or hanging side. The average width of the lode is from 6 to 30 ft. The average produce of the ore sold during the last three years was over 9 per cent.

To the east of the lode the rocks are traversed by faults and dykes; the direction about 15° west of north, and inclination towards the lode, 45° south and west. On the surface the first is 6 in. wide, 6 ft. east from this the second is seen, also 6 in. wide; these are composed of clay. Four fathoms further east the third is seen, composed of greenstone, and is 1 ft. wide. The sea now comes up to the rocks, but exploration in the mine proves that another fault lies beyond this, is 6 ft. wide, composed of clay and a compact trap rock. These mines were abandoned 100 years since, and in 1865, on the water being drawn out by the present company, the first fault was found to have intersected the lode at the bottom, or 93 fm. level. From appearances the old men considered the lode to be entirely cut off and destroyed. On following down the remains of the lode to a point it was again found exactly under the fault, or towards the smaller angle; this widened out, but at the 103 fm. level the second came in; by keeping on as before the lode was again recovered, the sinking still being kept on. At the 113 fm. level the greenstone dyke, or No. 3, intersected the lode, passed through, but did not displace it in the least. Only a little ore was met with between these intersections, but under the greenstone dyke the lode apparently became as rich as above the 93. On reaching the depth on the sump-shaft of 6 fathoms below the 150 fm. level the fourth fault intersected the lode, the sinking is still being continued (now 13 fms.) The fault was 6 ft. wide when first seen, but now only 2 ft., and the lode apparently is being carried with it further than by those above. I

have no doubt the lode will again be recovered under the fault towards the smaller angle. As far as I have seen, these intersections are not common in Sweden, and miners from different parts of the country corroborate this. The only instance is given by an old miner, 72 years of age: he says that some years since working in a mine 100 miles north from this they came done on a mass of clay; the mine was 100 fms. deep, the ore was lost, but no means were taken to get under the clay, as the mine was suspended. I have heard the mine is now being worked by a Newcastle copper extracting company.

The Professor of Mining from the Government School of Mines, Stockholm, was here a short time since. He expressed his surprise at the numerous intersections, as being very rare in Sweden, not having come under his notice in any other locality. As well as he could judge, he thought the lode would be again recovered under the fault towards the smaller angle. I have since been informed that the Professor now thinks a trial should be made in a westerly direction, to recover the lode; this to me appears to be going in the wrong direction, even supposing the lode to be "thrown up," and looks as if the fault should twice intersect the lode. I have seen many intersections in different parts of the world, but in no one instance have I seen the fault or slide intersect the same lode twice. I have received much valuable information from "Henwood on the Metalliferous Deposits of Cornwall and Devon," in the Transactions of the Royal Geological Society of Cornwall, vol. v., page 328, plate 11, and following. I do not profess to give the rocks in geological order, and do not know how far I am correct in calling these intersections faults or dykes, neither do I know the relation between them and the Cornish slides or flookans, possibly I may be more correct to call them clay dykes and greenstone dykes. I would fain hope that some of your geological mining readers will reduce to something like order the chaos of the above, and greatly oblige— JOHN SPRAGUE.

Solstad Mine, Misterhult, Sweden, Feb. 9.

DON PEDRO NORTH DEL REY GOLD MINING COMPANY.

SIR,—Again our monthly statement shows a serious loss, and yet our directors do not put forward any announcement as to the manner in which they propose to meet this increasing loss, which is, of course, irrespective of the heavy outlay in connection with the new machinery. When the mine was in a different position, we were informed from month to month as to our finances. Is it not of still greater importance to be informed now? Surely, we should know what proportion of the reserve fund is intact. The directors may reply by stating that all these matters will be dealt with in the annual balance-sheet; but when interim dividends were being paid we were not kept in the dark for 12 months, and why should we be now? It is of far greater importance to know the extent of our adversity than was it to be perpetually "congratulated upon our increasing prosperity." How much is this new machinery to cost? Why have we not been informed of this? Will it be 10,000*l.* or 20,000*l.*? If only the smaller item, where is it to come from? How to be raised? Will it become necessary to issue the unallotted shares? Are we to be compelled to wait in suspense till the annual meeting before we can know?—*Feb.* 22. AN ANXIOUS SHAREHOLDER.

NEW ZEALAND QUARTZ CRUSHING AND GOLD MINING COMPANY.

SIR,—Will you be good enough to correct a statement affecting the above company, which appears in the Journal of Feb. 11? The sample lot of 8 tons 16 cwts. of quartz referred to yielded 4 ozs. 3 dwts. of gold, worth 52*s.* 6*d.* per ounce, and the company's manager writes to say he can obtain as much as we want of this particular quartz to enable the company to obtain a profit of 15*s.* 7*d.* per ton on all the crushings. With only half our available machinery yet at work, we are, therefore, in a position to crush probably 150 tons per week, yielding gross earnings, at the above rate, of (say) 6000*l.* per annum. JOSEPH SIMPSON, Sec.

Cowper's-court, Feb. 20.

[For remainder of Original Correspondence see to-day's Journal.]

OUR NATIONAL RESOURCES.

One of the most valuable and interesting volumes we have for some time read has just been issued* under the title of "Our National Resources, and How they are Wasted," by Mr. WM. HOYLE, who has already earned a reputation as a writer upon the subject through his well-known pamphlet, "An Enquiry into the Cause of the Present Long-Continued Depression in the Cotton Trade, with Suggestions for its Improvement." Having himself considerable interests at stake, the author undertook personally to investigate the whole matter; his record of the result of his investigation will be most gratifying to inventors and patentees, and will prove invaluable to working men who may study the book. He shows that inventions and improvements in machinery by our countrymen have given us exceptional facilities for the acquisition of wealth; that these facilities are very much enhanced in their value by other important material advantages which we possess; that, aided by these facilities, our trade and commerce have been developed into enormous proportions, and that our opportunities for getting wealth have increased in a corresponding degree; that the commercial depression which has existed during the last few years has not resulted from any falling off in our foreign trade, but from a considerable decrease in the home trade; that this decrease has arisen mainly, if not entirely, from the improvident and unproductive character of our labour and expenditure, especially in reference to the article of intoxicating drinks; that notwithstanding our vast facilities for obtaining wealth, a large class of our population are constantly sunk in pauperism and destitution; and that if our labour were properly directed, and our expenditure properly applied, settled pauperism or destitution could not possibly exist.

It is to the labour of inventors that Mr. Hoyle attributes all our commercial progress. The entire exports of the United Kingdom for the whole *ten* years ending 1769 amounted to 157,052,626*l.*, whilst for the year 1869 *alone* they amounted to 190,015,230*l.*, or upwards of thirty millions more in value for one year than during ten years a century ago. In the year 1743, he says, commenced those mechanical improvements which have continued to progress, and which have resulted in the present expansion of our manufacturing industries. It was in this year that John Kay, of Bury, invented the fly shuttle and picking peg. Before his time the weaver, in order to work his shuttle, had to stretch his peg from side to side of the loom, and if the cloth were more than 36 inches wide it needed two persons to do this, one being unable to reach across the loom. By the use of Kay's invention a great loss of time was avoided, and where wide cloth had to be woven one person by the aid of these improvements could do the work formerly done by two. He then goes on to explain the nature and point out the great advantages resulting from the introduction of the drop-box, invented in 1769 by Robert Kay, son of the above; of Hargreaves' spinning jenny, invented about 1767; of Arkwright's water frame, or throstle frame, invented in 1769; and of Crompton's combination of Hargreaves's jenny and Arkwright's rollers to form the mule. Through the skill of Mr. Roberts, of Manchester, the mule was made self-acting, the spinner not having now to work or guide the mule, but simply to see to its being kept in order. The value of these accumulated inventions will be seen when it is remembered that before the invention of Hargreaves one person could only attend one spindle; at the present time one man, aided by a grown-up youth and boy, will tend a pair of mules having 1200 or 1300 spindles in each, or 2600 spindles altogether. If these facts be carefully examined it will be seen that one individual, aided by the machinery of the present day, will produce as much yarn as 750 persons could have done in little over 100 years ago; the result of these improvements being a large diminution in the cost of yarn, and a considerable increase of wages. A spinner in 1760 could only earn from 2*s.* to 3*s.* weekly, whereas now he can earn from 30*s.* to 35*s.* weekly. In the time of Crompton, which was after considerable improvements had been made in machinery, the cost of spinning weft 40 hanks to the pound was 14*s.* per lb.; 60 hanks, 25*s.*; and 80 hanks to the pound 42*s.* per lb. Now, the cost of producing will be 4*d.*, 7½*d.*, and 1*s.* per lb. respectively. Such are the advantages resulting from the invention of machinery.

The other points which Mr. Hoyle undertakes to prove are dealt with in an equally clear and practical style, the result being that he has produced a work which may be read with equal profit by the working classes, by employers, and by political economists who really seek reliable data for argument.

* "Our National Resources, and How they are Wasted:" an omitted chapter in Political Economy. By WILLIAM HOYLE. London: Simpkin, Marshall, and Co. Manchester: John Heywood, Deansgate.

LAXTON'S "BUILDERS' PRICE BOOK."—It would not be unreasonable to assume that a work which has reached its fifty-fourth edition must be well and favourably known to the members of trades to which it relates; but alterations and improvements are so constant that each edition of such a publication as Laxton's Price Book may really be regarded as an entirely new work. The authority of the book having been recognised by our Courts of Law in disputed cases, it is unnecessary to refer to the reliance that may be placed on it, and if any further evidence of its accuracy were required, no better could be offered than the mere statement that Messrs. Kelly and Co., of the Post Office Directory, have become the proprietors. The edition for 1871, now issued, has been thoroughly revised, and contains a large mass of additional information, the object having been to make the work not only useful to the trade, but to all those contemplating building, or who may wish to have repairs, alterations, or additions to their houses, by enabling them to estimate beforehand the expense of the work, or to check the prices charged after the work is executed. Some thousands of prices have been added of proprietary articles, modern inventions, and recent novelties; and in the present edition there is also given the whole of the Metropolitan Buildings Act, with notes of cases explanatory of its law and practice, the unrepealed sections of the previous Building Act, the Bye-laws of the Metropolitan Board of Works, and the list of district surveyors. It is evident that no pains have been spared in the preparation of the work, which is well deserving of the perusal of all interested in building, whether as tradesmen or capitalists.

FOUNTAIN PENHOLDER.—The inventions from time to time brought into the market for the purpose of avoiding the inconvenience of constantly dipping for ink have been very numerous; yet, owing perhaps to the facility with which they are put out of order, and their want of cleanliness, they have not come into general use. In the ink-supplying penholder, however, just introduced by Messrs. LETTS, SON, and Co., it is claimed that all the objections to their adoption have been removed. The new holder is of the "accommodation" class, but has the opening exactly opposite the usual place, and the spoon is stamped in one piece with the holder, so that the price at which the apparatus can be sold is of course lower. The superiority of the new holder, as compared with other similar contrivances, is its simplicity, and as it is easily cleaned, cannot get out of order, and fits any pen, it has much to recommend it. All that is necessary is to see that the spoon is properly adjusted when a new pen is inserted; no further notice is required—the pen is dipped in the ordinary way, and it will be found that at each dip sufficient ink is taken up to last the most rapid writer several minutes. The holders are well made, and likely to give general satisfaction. The boxes in which the holders are enclosed have labels that have been produced by Messrs. Letts's patent colour-printing process, and are really excellent specimens of workmanship.

FOREIGN MINING AND METALLURGY.

The state of the Belgian iron trade has improved. Numerous orders come to hand, and the forgemasters are profiting from the revival in affairs, their production being easily disposed of. At the same time, there is nothing very special to report. Official returns for the first eleven months of last year show that the imports of minerals into Belgium in that period were 525,436 tons, against 508,813 tons in the corresponding period of 1869, showing an increase of nearly 17,000 tons. Of rough pig and old iron the imports in the first eleven months of last year were 74,646 tons, against 50,537 tons in the corresponding period of 1869, showing an increase of about 24,000 tons. The exports of minerals from Belgium were 168,384 tons, against 153,140 tons in the corresponding period of 1869, showing an increase of about 15,000 tons. The exports of rough pig and old iron appear to have greatly fallen off last year, having been 6324 tons, against 13,526 tons in the corresponding period of 1869. The exports of rails from Belgium in the first eleven months of last year were only 118,503 tons, against 130,693 tons in the corresponding period of 1869, showing a decrease of about 12,000 tons. The exports to Russia decreased from 67,000 tons to 52,000 tons; to Italy, from 12,000 tons to 5000 tons; to Turkey, from 27,000 tons to 15,000 tons. On the other hand, the exports to the Zollverein increased from 7000 tons to 26,000 tons; those to France, from 2000 tons to 4000 tons; those to Spain, from 35 tons to 2700 tons; and those to Egypt, from *nil* to 1090 tons. The exports of Belgian rails to the United States seem to have remained about stationary, having been 7799 tons in the first eleven months of 1870, and 7773 tons in the first eleven months of 1869. The exports of plates from Belgium in the first eleven months of last year were 19,495 tons, against 19,274 tons in the first eleven months of 1869. The exports of rolled and hammered iron in the first eleven months of last year were 69,508 tons, against 74,838 tons in the corresponding period of 1869. The total quantity of iron of every description exported from Belgium in the first eleven months of last year was 234,386 tons, against 255,817 tons in the corresponding period of 1869. In these totals the following countries sustained the following shares:—Russia, 61,908 tons in the first eleven months of last year, against 75,823 tons in the corresponding period of 1869; the Zollverein, 51,350 tons, against 36,409 tons; the Low Countries, 25,497 tons, against 23,696 tons; England, 12,084 tons, against 11,015 tons; France, 29,836 tons, against 37,507 tons; Turkey, 17,799 tons, against 28,695 tons; the United States, 10,331 tons, against 11,669 tons. M. Goffin has been officially authorised to extend his Clabecq works. A similar authority has been granted to the Jupille Rolling Mills Company.

The deliveries of coal from Belgium have increased during the last few days to France as well by water as by railway; unfortunately, communication is not yet quite free and open, and the imperative importance of supplying Paris with the most urgent necessaries of life delays the movement of combustible. We learn, nevertheless, that large quantities of Belgian coal have found their way into the great city *via* Amiens. The irregularity of traffic will be only, it may be hoped, an affair of a few days. If peace be concluded, as it appears likely to be, the magnitude of the deliveries and the firmness of prices will probably compensate coalowners for the trials and difficulties which they have experienced for the last five months. The orders which come to hand are extremely numerous, and well nigh unlimited in amount. Coalowners refuse, under these circumstances, to enter into long-termed contracts. Great activity prevails in all the collieries, the extraction being pushed to its extreme limits. It will take a great deal, however, to compensate for the loss which Belgium has experienced through the partial closing of the French markets, a loss which is estimated for the first seven months of 1870 at more than 160,000*l.* The spring is approaching, and with it the brickmaking season. The brick trade is likely to be very flourishing this year, as there are, unfortunately for France, a great number of ruined houses to repair in that country. It appears that in the first 11 months of last year 200,758 tons of coal were imported into Belgium, against 207,689 tons in the corresponding period of 1869. Of coke the imports were 7765 tons and 7539 tons, respectively. As regards the exports of coal from Belgium, they amounted in November to 151,550 tons, against 387,864 tons in the corresponding period of 1869, showing a decrease of 236,314 tons. In the first 11 months of last year the exports were 2,980,654 tons, against 3,285,721 tons in the corresponding period of 1869, showing a decrease of 305,067 tons. The exports of coke from Belgium in November were 33,035 tons, against 53,776 tons in November, 1869; and in the first 11 months of last year 569,414 tons, against 598,819 tons in the corresponding period of 1869, showing a decrease of 29,403 tons. As regards the value of the coal and coke exported to Nov. 30, last year, it presented a diminution of 183,040*l.*, as compared with the corresponding period of 1869. Contracts for a number of coal trucks (800) have been let during the last few days at Brussels. The trucks, which are to carry 10 tons each, were contracted for in lots of 20 trucks each, and the lowest tender was delivered by MM. Brison and Co., of Mont-sur-Marchienne; the amount of the tender of this firm was 4190*l.* per lot.

The total value of the production of the mineral and metallurgical establishments of Bavaria in 1869 has been officially returned at 1,470,921*l.*, or 288,618*l.*, or 24·40 per cent. more than in 1868. The royal establishments contributed to this total a sum of 274,050*l.*, or nearly 19 per cent., and private establishments made up the balance. The total quantity of coal produced in Bavaria in 1869 was 681,142 tons, showing an increase of 64,251 tons, or 10·40 per cent. upon the production for 1868. More than half the total production, or 352,582 tons, came from workings in the Rhenish Palatinate. The State possesses five collieries, which furnished 355,282 tons of coal in 1869. As regards lignite, 34 establishments devoted themselves to its production, and they furnished 53,579 tons; as compared with 1868, however, the production declined 66,259 tons, or 55·30 per cent. The production of ironstone was carried on in 208 workings, employing 728 workpeople, and the total production was 212,030 tons; this production presented an advance of 15¼ per cent. upon the corresponding production for 1868. Between 1858 and 1868 the annual average production was 147,722 tons. Iron in bars and rolled iron appears to have been made in Bavaria in 1869 to the extent of 126,608 tons; plates were also made to the extent of 618 tons. The production of steel in 1869 was about 4000 tons; the corresponding average production for the ten years between 1858 and 1868 was 399 tons.

The French copper markets present comparatively few points of interest. The pre-occupations of the moment are directed to other matters, and the time is not yet arrived for profit to be derived, from the smallness of the supplies brought forward. The German markets present generally more animation, and but for considerable transport difficulties affairs would be resumed upon a very large scale. It is only, however, on the conclusion of peace that German industry will resume its full development; at present transactions only take place to meet the immediate requirements of consumption, and if prices are maintained with firmness, there is not much tendency upwards. No change has occurred in copper upon the Dutch markets. The Dutch tin markets have been somewhat feeble. Disposable Banca has been dealt in at 77½ fl.; for delivery at the spring sale of the Society of Commerce the quotation has been 76 fl. Billiton has been dealt in at 76 fl., but transactions have not been numerous. Transactions in lead have been rather insignificant in Germany; the stock is every day increasing, nevertheless prices have not fallen. At Rotterdam, Stolberg and Eschweiler have made 11 fl., and lead of various marks 10¾ fl. The advices received from Germany with regard to zinc are scarcely satisfactory. Consumption has no very pressing requirements to satisfy, and speculators do not show much disposition to occupy themselves with the article. Some small lots have recently changed hands at Breslau at rather higher rates, but these unimportant sales have not exerted much influence upon the market. Stocks continue to increase, and no change is anticipated until the export movement becomes more considerable.

MINING IN AUSTRALASIA—MONTHLY SUMMARY.

THE BURRA BURRA MINE—ITS HISTORY.

As active operations are now about to be resumed at Burra Burra Mine, it may not be out of place to glance briefly at its history, and to show by a few figures what that long-dormant property has done in years gone by for its proprietors and for the colony.

Few, comparatively speaking, are aware that the South Australian Mining Association had no original connection with the Burra Burra Mine. It was formed before that lucky-bag was discovered, its object having simply been, as its name indicates, the general pursuit of mining in the colony. It started with a moderate capital, and the directors purchased several sections of supposed mineral land, but had done nothing further when the great discovery was made which led to so much speculative excitement. The first indications of copper in the neighbourhood were observed by a shepherd in the service of Mr. F. H. Dutton, who, in 1845, found some valuable specimens on what was afterwards known as the Princess Royal property. The immediate vicinity of the Burra Burra was not known to be metalliferous until some months later, when a bullock-driver, named Thomas Picket, in the employ of Mr. Wm. Robinson, then of Gum Creek, pointed out a large mass of red oxide of copper cropping out from the surface of the ground where the Burra Burra Mine now stands. At that time the only way to secure the newly-found mine was by the purchase of 20,000 acres of land, as a special survey, at the fixed price of 1*l.* per acre. One-half the sum was understood to be forthcoming from a few gentlemen who acted together, and who afterwards composed the proprietary of the Princess Royal; but the raising of the remaining half was a matter of the utmost difficulty, and the idea occurred to those who were active in the matter of applying to the directors of the South Australian Mining Association, who had a portion of their capital uninvested. After some consideration the directors agreed to enter upon the undertaking, and by their aid 20,000*l.* was made up.

Agreeably to the understanding between them, the two parties who thus became the purchasers of the special survey, and who were at that time popularly known as the "nobs" and the "snobs," drew lots for the choice of the newly-acquired property, and fortune decided in favour of the latter, who selected the northern end, which comprises the Burra Burra Mine. As the South Australian Mining Association already possessed a deed, and was in fair working order, it was determined to increase the number of shares so as to admit the new proprietary, and thus the Burra Burra Mine became the property of the existing company. There was, of course, a considerable infusion of new blood into its board of management, and the same energy which had characterised the promoters in their struggles to obtain the Burra Burra Mine was displayed by them in its immediate working. The returns from the very surface operations exceeded the most sanguine expectations that had been formed. Shares rose enormously in price, and very soon their value was placed beyond all doubt by the payment of large dividends.

During the first half-year, ending April 30, 1846, 2959 tons of ore were raised, at a cost of 5*l.* 7*s.* 7*d.* per ton=15,926*l.* 18*s.* 8*d.* The price realised was 12*l.* 1*s.* 1*d.*=35,678*l.* 8*s.* 10*d.*, leaving a profit of 6*l.* 13*s.* 6*d.* per ton, or 19,751*l.* 10*s.* 2*d.*—nearly double the purchase money of 10,000*l.* The quantity of ore raised during the next twelve months was 6880 tons, yielding a net profit of 6?,034*l.* 13*s.*, and this dazzling state of things continued for several successive years, the profits for the twelve months ending in March, 1851, being over 115,000*l.*, and for the next six months nearly 50,000*l.* But then the attractions of the gold diggings began to tell upon the great copper mine, wooing away its lusty Cornishmen to Forest Creek and Bendigo. Thus we find the next half-year (March, 1852) yielding under 37,000*l.*, and in the following twelve months the profit fell short of 12,000*l.* After that things improved, and the figures at the end of March in succeeding years stand roughly as follows:—1854, 25,000*l.*; 1855, 27,000*l.*; 1856, 26,000*l.*; 1857, 43,000*l.*; 1858, 39,000*l.*; 1859, 45,000*l.*; 1860, 30,000*l.*; 1861, 17,000*l.*; 1862, 20,000*l.*; 1863, 24,000*l.*; and 1864, 30,000*l.* But that was the last year of real prosperity. The cost of raising the ore and the price obtained for it were gradually approaching closer to each other, and though the six months ending in September, 1864, gave a profit of 12,778*l.* 0*s.* 7*d.*, the next six months showed an actual loss of 634*l.* 9*s.* 1*d.*, and the profit of 3520*l.* in Sept., 1875, was swept away during the three years following, which showed, in addition, a loss of more than 26,000*l.*—the ore which cost 14*l.* 1*s.* 3*d.* and 15*l.* 8*s.* per ton, realising only 11*l.* 4*s.* 4*d.* and 13*l.* 5*s.*

These are the last transactions that have taken place. The result of the 23 years' operations was the raising of 220,173 tons of ore, averaging 22 per cent., equal to 49,310 tons of copper. The average value of the metal during the same period was 92*l.* per ton, which gives a total of 4,536,520*l.*; but allowing for freight and charges on the ore not reduced into copper, the gross value to the company would probably be about 4,000,000*l.* sterling. The actual profit made during the period referred to, exclusive of rents and sundries, was 871,594*l.*, of which 776,160*l.* has been divided among the shareholders in 55 dividends, or 315*l.* on each share of 5*l.* in the subscribed capital. The balance, 95,434*l.*, is represented by additions to the working capital and undivided profits, which of course include purchased land, machinery, and plant. The total cost of raising the ore was 2,059,644*l.* 1*s.* 1*d.*; but large as this expenditure appears, it does not show the amount actually set in motion among the colonists, as the greater part of the outlay of the English and Australian Copper Company, which may be roughly stated at something over a million, representing the difference between the value of the copper as stated above and the sum realised by the Burra Burra Company, may fairly be added, their expenditure for many years having been mostly incurred in reducing the Burra ores into copper.

Figures, however, cannot show all the benefit which arose from the working of the Burra Burra Mine. Its effect upon the depressed and struggling colony was absolutely talismanic. New roads, new towns, new industries sprang up in succession, and a period of prosperity commenced, which was only checked for a time by the gold discoveries in the neighbouring colonies. The temporary closing of the Burra Burra Mine has been simultaneous—though but partially connected—with another period of depression; and perhaps it may not be too much to hope, in the prospect of an abundant harvest, that its re-opening may accompany and, perhaps, partly aid in occasioning a renewal of South Australian prosperity.

The London manager is Mr. John Darlington, of Coleman-street, Moorgate-street, at whose office every information relative to the company may be obtained.

THE MOONTA (COPPER) MINE, about 90 miles from Adelaide, South Australia, started with no capital, and has existed entirely on the proceeds of the ores raised. From 1862 to November, 1870, it has paid in dividends 544,000*l.*, being equal to 170*l.* upon each share on the old register.

The year 1871 opens auspiciously for the mining interest. Ballarat is recovering from her recent depression, and the Bendigo reefs may be said to be as prosperous as they ever were. Many of these reefs, which have been worked for some 14 or 15 years, are still yielding largely at very great depths, and with no signs as yet of "giving out." We are informed that the yield of gold in Sandhurst, the capital of the Bendigo district, for November was 23,317 ozs. 14 dwts., the largest quantity that has been obtained for a like period for a long time past. The returns for the month of December, so far as ascertained, are equally good.

The Ballarat reports are little less satisfactory. The Hand and Band Company, after many years of patient waiting, and after an expenditure, as is alleged, of over 300,000*l.*, paid their first dividend last month. The St. George and Band Company have also paid three dividends during the last six weeks, and the Park Company are also obtaining large weekly yields of gold. These various companies, together with many others, may be said to be within the precincts of Ballarat. The Winter's Freehold, including some 1100 acres of land, in the suburbs of Ballarat, is still the subject of "great expectations," and if one or two good leads are found under this property they will go far to re-establish the character of "the premier gold field" of the colony.

Simultaneously with the improving condition of Ballarat we also read of a new valuable discovery, and a consequent new rush, at Buninyong, about seven miles from Ballarat, on the Melbourne side.

Reports from other districts are also very encouraging to miners and to others interested in mining property. The Long Tunnel Company, at Walhalla, in Gipps's Land, recently obtained 3362 ozs. 11 dwts. for one month, which, at 4*l.* an ounce, is some 160,000*l.* a year (minus the cost of crushing and raising), to be divided among a not very numerous proprietary.—*Melbourne, Jan.* 3.

AUSTRALIAN MINES.

YUDANAMUTANA (Copper).—The directors have advices from their superintendent, dated Adelaide, Jan. 4. He states: "We are now down 16 fms. with the main shaft, the next 10 fathoms, will be easy, as we ought to hole into some old workings. The important reductions recently made in the cost of cartage, wood, charcoal, &c., will now begin to tell favourably upon our expenditure, and when the downright is complete I am certain an end will be put to all our difficulties, in proof of my confidence in which I will gladly accept the 490*l.* (700*l.* nominal value) worth of bonds allotted to me, and intend besides to secure some shares. I visited the mine in December and carefully inspected it, and am convinced that we have an immense mass of ore in Hill's lode. Capt. Terrell and some of my best men are of opinion that we may sink a few fathoms upon the lode with simply barrels to keep the water in fork, but, upon consultation, we have concluded that it would be unwise to touch the lode until we have perpendicular means of hauling the ore and raising the water. We are working upon a new branch of carbonates at the 40, and which is yielding well. The bricks we are now making are splendid. Our fire and common brick making has been a great success."—Capt. Terrell reports, under date Dec. 26: "Blinman Mine: I have put four men to drive south on a branch of carbonate ore on the top of where we first struck the sulphurets, in Hill's lode. When we first started the branch was about 6 to 8 in. wide, but I am pleased to say that in driving the width has increased to about 12 in. The new engine-shaft is down about 16 fms., and has cut through some very nice branches of ore, making good smelting work. It will, I believe, in sinking cut through some richer branches, which will pay the expense of sinking the shaft.—Water: Nothing has been done here since I reported cutting the water—in fact, it would not pay to work the lode with our present appliances, although all the miners who have seen it concur in saying it is the finest lode they have ever seen. I have myself seen some of the finest lodes ever opened in South Australia, and can confidently say I have never seen anything to equal it. Ore raised and smelted, 213 tons. Copper made 17 tons 15 cwts."

PORT PHILLIP AND COLONIAL (Gold).—The directors have advices from their resident director at Clunes, dated Dec. 31: The quantity of quartz crushed during the four weeks ending Dec. 7 was 490 tons; pyrites treated, 91 tons. Total gold obtained 1456 ozs. 6 dwts., or an average per ton, including pyrites gold, of 5 dwts. 22½ grs. The receipts were 546*l.* 14*s.* 1*d.*; payments (including 79*l.* paid on account of firewood and timber contracts), 426*l.* 9*s.* 9*d.*: profit, 120*l.* 4*s.* 4*d.*, added to which was last month's balance of 2156*l.* 9*s.* 6*d.*, thereby making an available balance of 3357*l.* 13*s.* 10*d.* The amount divided between the two companies was 1200*l.*, the Port Phillip Company's proportion of which amounts to 780*l.* The balance of 2157*l.* 13*s.* 10*d.* was carried forward to next month's account. The return for the two weeks ending Dec. 21 is as follows: Quartz crushed, 2354 tons; total gold obtained, 717 ozs. 17 dwts., or an average per ton, including pyrites gold, of 6 dwts. 2 grs. The remittance 700*l.* The directors have also received the following telegram, dated Galle, Feb. 19, in

anticipation of the mail leaving Melbourne, Jan. 31, and due here March 20: Last month, ending Jan. 4—yield, 6 dwts. 9 grs. Two weeks ending Jan. 19, 6 dwts. 21 grs.; remittance, 600*l*. Collins-street title passed; money next mail; sale price 4000*l*.

AUSTRALIAN UNITED (Gold).—The directors have advices from Australia, dated, Fryerstown, Jan. 2: Central Mine: Capt. Angove reports to Mr. Kitto as follows: "I have the honour to report that during the past month we have communicated the main drive with the eastern winze, completed 'jump-up,' and struck wash at 16 feet above the roof of the main level. On the 28th inst. we opened out in the 'jump-up,' leaving a thin layer of slate roof between the roof and the wash. This had to be done to keep the place from being flooded, but we intend gradually rising the drive as we proceed from the 'jump-up,' until we have the wash abreast of us, and the water perfectly under control. From what we saw of the wash when it was first pricked, there can be no doubt of its payable character once we are fairly opened on it. It would afford me much pleasure to send a prospect, but I cannot see our way clear to remove the laths without very much retarding the progress, as well as endangering the safety of the mine. I hope, however, in the course of a few days to report more fully on this part of the mine.—Main South Drive: Our operations during the past month have chiefly been confined to the western side. Having met with a run of cemented wash about 30 feet from the south boundary line, we followed it up by a drive both east and west. The former ran out the cement in about 20 ft., the latter in about 30 feet, into a good layer of wash-dirt; but the eastern ground being very wet, we have had to defer stoping in that direction until it is properly drained. Our eastern drives are in 112 and 125 feet, respectively, and no appearance of the wash running out or the drives reefing. Our blocking out, then, has been confined to the western side. The southernmost drive reefed 114 feet west from the south drive. The ground between it and the line where the wash thins out on the reef (about 20 feet from the southern boundary) has been stoped away on either side of the 114 ft. drive. While this was going on another drive, about 70 feet further north, was put in and reefed at 174 feet. The greater portion of the ground between this and the 114 feet drive is blocked away. At 130 feet west from south drive the ground dips north-west, about 5 in 100, which makes it very heavy to work through, having to ball all the water that may chance to find its way into the workings, besides the disadvantage of putting all the dirt up an incline. All this would be avoided if we were in a position to extend the main drive westward. North of the 174 feet drive, we have another drive 160 feet west, but no sign of reefing, or the wash running out. The dip is about the same northwards, but I think we have crossed it westerly. The appearance of the wash-dirt in this part of the mine is sufficient to justify your most sanguine expectations. Having produced from the 1st. to the 24th inst. 206½ ozs. of gold from 5177 trucks of dirt, giving an average of more than 19 grs. to the truck, it wants no other evidence to prove the mine a great success once the main drives are extended, and 'jump-ups' placed in proper manner. It is then only a matter of a small outlay of capital to bring this mine to a successful issue. Permit me to say that had we been privileged with an outlay of a few thousand pounds, instead of stoping out the ground close upon the drives, we should have extended our mine to a much greater advantage, and when we once began to strip give handsome dividends. As it is, we have to reap the crop before it is ripe, in order to carry on the works at all. Situated as the Great Central Mine is, in the centre of a large area of ground, without the least assistance from any company, it is only reasonable to expect that more than ordinary difficulties will have to be contended with. Were it not for this the Central Mine would at this day be in the hands of working men. There is a superabundance of water to contend with that cannot be in an ordinary district, which requires time and perseverance to drain out. But drain it will; and the success dependent on it will be more than commensurate with the difficulty—it is certain success. When we compare the outlay of this mine with that of the mines in Ballarat before getting gold, it sinks into insignificance. I never knew a a mine with such prospects as this with such small outlay. As an instance of the necessity for extending the drives previous to blocking out, I refer you to the influx of water which suddenly took place on Sunday the 18th, and on Friday, the 23d inst. The first 'burst' did little harm; the last was a perfect flood, filling all the lower workings with water, fine silt, and sand, so as to delay the whole of this week from getting properly into working order. We shall, all being well, resume working at the new year with out full complement of men." Mr. Lamb, in a letter to the directors, writes:—"You will be pleased to see, by the enclosed returns, that the Central Mine has been yielding for some weeks past a fair amount of gold from the blocking ground west of the main south lode. . . . About 1200*l*. worth of gold in less than five weeks is an improvement, and I trust that this western ground will continue to yield as well; and the eastern, or deep gutter, prove, as may reasonably be expected, better quality still."—Duke of Cornwall Mine: Capt. Williams reports to Mr. Kitto as follows:—"I beg to report on the progress of the Duke of Cornwall Mine for the past month.—Dauke's Shaft (262 feet level): Ground very hard greater part of month, progress very slow in consequence, the miners not being able to drive more than 3 ft. a week, working the 24 hours. The last two courses of sandstone were much thicker than in the 200 ft. level.—Dauke's Shaft (200 ft. level): A fresh winze has been struck on the lode farther north, lode underlying (5 ft. in a fathom) same angle as the first winze commenced on the cross-cut. We cannot attain a greater depth at present than 25 ft. below the level, on account of the water. I have also commenced a light winze in the 200 ft. cross-cut 60 ft. east of lode, which it will intersect about 30 ft. This is to communicate with level below.—Prospecting Shaft (north end of claim): We calculate to sink about 18 ft. deeper, making in all about 100 ft. in depth, and then to drive for the lode. No other change."

SCOTTISH AUSTRALIAN.—The directors have advices from Sydney, dated Dec. 30, with reports from Lambton Colliery to the 28th. The month of December not being completed when the mail left, the superintendent was unable to advise the total sales for that month. He reports that he had just returned from a visit of inspection to the colliery, where he found that matters were proceeding satisfactorily.

ENGLISH AND AUSTRALIAN (Copper).—The directors have received advices from their manager, dated Port Adelaide, Jan. 4: The quantity of coal at Port Adelaide was about 1069 tons. The furnaces at the Port Works were let out on Dec. 31 for the half-yearly stock-taking, but would be re-lighted in a week. Since date of last advice, no further copper had been shipped, but there were 104 tons ready for shipment.

ANGLO-AUSTRALIAN (Gold).—The directors have advices from Australia, dated Jan. 2: The agent, Capt. Ralsbeck, reports: I have the honour to report progress since the 5th ult.—No. 2 Engine-shaft: Present depth, 123 ft. No change worthy of note. Sinking principally through a sandstone country.—Engine and Boiler-house: The outer loading is completed, the boiler finished and set, and the boiler-house will be completed in about four days. The chimney and end of the building are pointed down, also both sides for about 4 feet. Redhouse and Co., holding a claim in the centre of the company's lease, have struck the eastern lode with splendid results, 40 tons giving 42 ozs. Mr. Lamb writes that about 1½ ton of quartz from the western shaft leader has been crushed, and just cleared up, giving 2 ozs. of gold.

FOREIGN MINES.

ST. JOHN DEL REY.—The directors have received the following report, dated Morro Velho, Jan. 17:—Morro Velho produce for December, 10,991 oits., from 4079 tons ore, yield 2·696 oits. per ton. Morro Velho cost for December, 4532*l*.; loss for December, 291. Morro Velho produce 11 days of January, 3436 oits.; yield, 2·312 oits. per ton.

DON PEDRO.—Mr. F. S. Symons reports for December: Produce, 6411 oits., at 8s. 6d. per oit., 2724*l*.; cost, 3265*l*.; loss, 541*l*. The greater proportion of ores have been excavated from Alice's West, but of lower standard than in November, and yielded none of sufficient riches for box work. The lodes maintain their size and promising appearance, and at times box work samples have been taken; but no defined line has yet been encountered. Under date Jan. 17, it is stated:—Produce, 2191 oits. Permanent machinery for pumping is arriving fast. Yesterday I dispatched a troop of 46 mules to bring some of the smaller pieces. The excavation for wheel pit progressing most satisfactorily.

ROSSA GRANDE.—Mr. Ernest Hilcke reports for December: The gold return for the month amounts to 2092 oits.; total cost for the month, 879. Under date Jan. 16, it is added: The lode in the 50, and in the stopes below same, as well as that in the barrow-road, is still decreasing in size, and only a very small quantity of stone has been obtained from these places during the past fortnight. Unless we meet with something better, I fear the produce of this month will not be so favourable as that of December.

ANGLO-BRAZILIAN.—Mr. F. S. Symons reports for December: Produce, 2050 oits., at 9s., 922*l*.; cost, 1417*l*.; loss, 495*l*. The lodes maintain their size, and an improvement in auriferous quality appears to be taking place. Under date Jan. 17, it is added: No alteration to note, lodes maintaining their size, sanitary state of force favourable, attendance improving, and works at the different sections progressing satisfactorily.

GENERAL BRAZILIAN.—Capt. Thos. Treloar reports for December: The month has been wet and unfavourable, yet fair advancement, on the whole, has been made.

TAQUARIL.—Mr. T. S. Treloar reports for December: The stamping mill was put regularly to work on the 1st. inst., and excellent duty has since been done, but the gold return for the month scarcely comes up to our expectations, amounting to 2138 oits. only. The circumstances, however, attending this unsatisfactory result are extenuating; a large quantity of poor matter removed from old excavations has gone through the stamps, and up to the 24th but little could be done to the shoots owing to water. Taking the above figure, therefore, as a criterion for future returns would not be an act of justice to the mine. Next month we shall have a fair beginning, and the results will, I feel confident, be more pleasing. The produce has been derived as follows:—Stamps, 1266 oits. from 807·75 tons of stuff=1·56 oits. per ton; vein stuff, 872 oits. from 3·25 tons of stuff=268·30 oits. per ton: total, 2138 oits. from 811·00 tons of stuff. On Dec. 24, the ground in Haymen's shaft becoming favourable, the water from the bottom of the old excavations upon the rich shoots was let down, and we were thereby enabled to extract some excellent boxwork. The rainwater since has occasionally found its way down to our works, notwithstanding the number of surface drains made, and other precautionary measures taken to prevent same. The penetration of footwall of under lode in Haymen's shaft will, we expect, effectually remedy this. Operations in Martin's cross-cut were resumed on Dec. 20, and we are now extending westward on the auriferous lode therein met with. At the deep adit but poor duty has been done, owing to hardness of ground. The works in Rouse's level are advancing steadily.—For the first division of January, Mr. T. S. Treloar writes that "The force is adequate to requirement, weather favourable and works generally progressing with regularity. Less crushed matter having to date been stamped, and more vein stuff obtained, produce is looking considerably better than for the first half of December, and as dimensions and auriferous properties of shoots manifest no signs of declination, I confidently confirm the statement made in accompanying report with reference to favourable result of current month's operations. The rise from Rouse's level reached the surface on Jan. 12. Works connected with Casa Grande have been resumed."

BRAGANZA (Gold).—Captain Roberts, Jan. 16: In A deep adit we have holed the winze, distance 116 ft., on No. 1 lode, communicated with the level above, and are now throwing down the quartz from the different lodes ready for stamping. In D cross-cut we are actually driving by the side of the lode, for want of room to store the ore. Morro das Almos rego (watercourse), I have great pleasure in informing you, is finished, and the water running home to the mine for less expense than was estimated. The small stamping-mill commenced working on the 8th inst. with a full supply of water, and will continue to work day and night without interruption. The new additional (and a much more powerful) stamping-mill will be set to work by the end of February, when you may expect regular returns. The staff are all in excellent health.

EXCHEQUER (Gold and Silver).—L. Chalmers, Jan. 24: As neither the 50 nor the 80 realised my justifiable anticipations of the ledge at those levels, I have dropped running these, and recommenced sinking, according to my original plan, and been again rewarded with a shoot of ore that will assay from $40 to $235 per ton, and which we have had all the way from the 86 to the 97, and better at the 97 than at the 86; possibly the top of a rich bonanza. During last week the main tunnel was run in 5 ft., and the appearance of the face still improving. The winze was sunk 6 ft. in good ore. The water is less than last week.

PESTARENA UNITED.—James Roberts, Thomas Warne, Feb. 13: Peschiera Mine: The rise in back of the 33, on No. 5 lode, yields 3½ tons per fathom, worth 18 dwts. of gold per ton. The end driving north in the 33, on No. 2 lode, yields 2 tons per fathom, worth 12 dwts. per ton. The stope in the north end of the winze, in bottom of the 46, yields 5 tons per fathom, worth 15 dwts. per ton. The 65 end north, on No. 2 lode, yields 2 tons per fathom, worth 1 oz. per ton. The stope in bottom of the 75 yields 10 tons per fathom, worth 1 oz. 3 dwts. per ton. We are pleased to say that we have connected the new pumping-gear to the wire-rope transmission in the 65, which is working well, and pumping water to satisfaction; and have also commenced to sink the north inclined engine-shaft under the 80, on the big shoot of ore, where the lode will yield 8 tons of ore per fathom, worth 1 oz. 7 dwts. of gold per ton.—Boundary: In the 20 end, driving north, there is no change since last week.—Acquavite Mine: The 23 end, driving south, continues poor, but favourable for driving. The 23 end, driving north, yields 4 tons per fathom, worth 10 dwts. per ton. The end of ground in the stope in bottom and behind this end will yield 8 tons per fathom, worth 1 oz. per ton. The 33 end, driving south, yields 3 tons per fathom, worth 10 dwts. per ton. The 46 end, driving south, continues in a hard bar of rock, yielding 3 tons per fathom, worth 1 oz. per ton. The 55 end, driving south, yields 3 tons per fathom, worth 10 dwts. per ton; and the 55, driving north, yields 4 tons per fathom, worth 18 dwts. per ton. There is no change to notice in any of the stopes not mentioned.—Surface: We have succeeded in taking abroad and getting to surface an old bob and rods that were in the Beck shaft, and we have commenced to take away the wells around the mouth of same for re-building.

— Thomas Roberts, James Mitchell, Feb. 17: Val Toppa Mine: In the cross-cut west, above No. 2 level, we have cut further into the western part of the great quartz lode. We shall be able to speak more on this point when we have reached the foot-wall of the lode. The ore continues of good appearance. We have not yet amalgamated any of it, on account of the severe frost about the small trial mill. The end driving north in No. 2 level, on this lode, yields 8 tons of ore per fathom, worth 10 dwts. per ton. The end north of the second cross-cut, in No. 3 level, is much the same as last week—10 tons, at 12 dwts. per ton. Although the ores coming from the stopes in the bottom of the No. 2 north, and south of winze, on the new lode, has much the same appearance as when we drove through it, it has not as yet yielded so well. All the other stopes are without change. The weather continues severe at the mine, so much so that we have not been able to pick the ore, and a great quantity of rock that would be picked out in fine weather is now being brought down and amalgamated with the ore, so that our gold production will be much less for this month than the past.

CAPE (Copper).—Capt. Williams reports the discovery of a rich course of ore at the bottom of engine-shaft (referred to in superintendent's previous report). Yield, Ookiep, 480 tons; Spectakel, 100 tons; transport, 320 tons. The railway was completed to Mulshondefontein, and was to be opened on Jan. 2. Mr. Thielen reports commencement of smelting operations, both in reverberatory and blast-furnaces. The Ocean King and the Patagonia had arrived out, the former having on board the locomotive for tramway. Bills of lading are received for 380 tons, per the Antonio Vinent. The Croydon has arrived at Swansea with 520 tons of ore. Since last report 350 tons of ore, *ex* Glanrafon, have been sold at 13s. 3d. per unit by private contract; 940 tons *ex* Limena and Refuge have been entered for sale by public ticket on March 7.

[For remainder of Foreign Mines see to-day's Journal.]

ABSORBING SULPHUROUS FUMES.—The method proposed by M. CAHEN, Mulheim-on-Rhine, Prussia, is based upon the transformation of the oxides of manganese or of metallic iron into salts of manganese or iron, by more or less rapid absorption of sulphurous acid. The oxides of manganese, which contain a certain proportion of peroxide, have especially the property of instantly combining with sulphurous acid, and the inventor, therefore, proposes to employ peroxides of inferior quality, which may be obtained at a low price, but should these become too costly he can make use of other oxides of manganese without peroxide, or he may use metallic iron.

STEAM GENERATORS.—The invention of Mr. H. PETITPIERRE, of Paris, consists of a metal pipe disposed within the furnace and extending longitudinally at the lower part of the flues, finally returning to the furnace. Through this pipe steam is conveyed from the boiler, charged with a considerable quantity of water, which in the passage of the steam to the cylinder along the interior of the furnace is completely evaporated by the heat of the furnace, the steam being thus dried. A valve in this tube admits the steam thereto by the pressure in the boiler, the valve closing by its own gravity, when the steam so admitted attains (on becoming superheated) a higher pressure than that in the boiler, and it then passes to the cylinder.

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Hudson River Copper Company,

NEW YORK, UNITED STATES,

SULPHUR, COPPER, AND NICKEL MINES.

Incorporated Nov. 11, 1864, under the General Act of Feb. 17, 1848, and Amendment Acts passed since.

The shares are all fully paid.

The Capital is 1,500,000 Dollars (say £300,000) in 60,000 Shares of 25 Dollars (say £5 each).

THE TRUSTEES AND DIRECTORS ARE—
WILLIAM KEMEYS, New York—PRESIDENT.
ALFRED F. KEMP, Staten Island—TREASURER.
WM. N. ARMSTRONG, New York.
GEORGE M. WHEELER (of W. Bailey, Lang, and Co.), Westchester County.
EDWARD KEMEYS, New York.

SECRETARY—THEODORE CLARKSON, Brooklyn.

OFFICES,—29, WILLIAM STREET, NEW YORK.

BROKERS—LOUNSBERY AND FANSHAWE, 8, Wall-street, New York.
COATES AND HANKEY, 24, Gresham-street, London.

AGENTS IN LONDON—CHILD, HORNBY, AND CO., 27, Lombard-street, London.

COUNSEL AND SOLICITORS—Mr. JOHN L. SUTHERLAND, New York.
Messrs. KIMBER AND ELLIS, 79, Lombard-street, London.

The mine of this company is situated at St. Anthony's Nose, on the Hudson River, about forty-five miles from the city of New York. It is within easy access from the city by railway, river, and road. The property lies in the township of Cortlandt, Westchester county, and the township of Phillistown, Putnam county, both in the State of New York, and can be readily seen by reference to the map. The present workings of the property are on 52 acres (freehold), which lie in Putnam county. Besides this, the company have in the same county a 15-years lease of 250 acres of land adjoining the 52 acres. There are 80 acres in Westchester county, which the company have the right to purchase for $15,000 at any time before Nov. 23, 1872, on which property also they hold a lease for 15 years still to run. The company are paying for this lease $1500 for this year (1870), and will pay $2000 for 1871, and $2500 for 1872 and subsequent years until the end of the lease, unless previously purchased, which it is the intention of the company to do. These lands cover everything known of the mine, and are in length about one mile. The river frontage of the property is 600 ft. in length, and is within 100 ft. of the channel of the river, where the company's new dock is being built, and is nearly completed, alongside which a vessel of 3000 tons can load.

CONTENTS OF THE MINE.—The mine now opened is found, as was anticipated, to be a solid mass of pyrites, consisting chiefly of sulphuret of iron and sulphuret of copper. Some nickel has been found in samples of the former assaying ¼ per cent. to 6 per cent. If this should prove continuous, it will of itself be extremely valuable and profitable in addition to the sulphur and copper. These ores are mixed with quantities of hornblende, apatite, or phospate of lime and felspar. As a source of immediate profit, the sulphur ore only, which the mine furnishes in great abundance, is being worked and sold at a profit of about $2½ per ton, while the rich copper ore is laid aside for the present, and stored to be dealt with hereafter.

WORK DONE.—Since the formation of the company, six years ago, they have had great difficulties to overcome in the dead work at the mine, and in opening up a market for the sulphur ore among the chemical manufactures, both of which have now been accomplished. This period has been occupied in the construction and perfecting of the mine shaft, with connected level, tracks, cars, tramway, &c., besides getting considerable quantities of ore mined out and ready for delivery. The lower tunnel or adit level running into the vein is 300 ft. long, and the shaft is 180 ft. deep. Not having been run to exactly meet, the two have been connected by large stopes in the vein. Splendid ventilation has been thereby secured. Being from 700 to 900 ft. above the natural drainage of the country, the mine is insured against any serious trouble from water, and no pumping is required. All the water now entering the mine comes from the surface.

PRESENT CONDITION.—The directors are taking steps to procure the speedy completion of the new dock at the termination of the new road just finished, by which a saving of 50c. per ton or more will be effected in the transportation of the ore to the ships. The new road is a continuous inclined plane of about one mile. The road heretofore used is circuitous to the extent of about three miles, and has some up grades. The company has a market already for its sulphur ore at $5 per ton. It has the additional advantage of a customer in the immediate neighbourhood, in a firm which has erected large vitriol (sulphuric acid) works alongside the company's new docks. It is found that the ore makes as high a quality of vitriol as the Sicilian sulphur, and burns well. The manufacturers are learning to roast the ore now to such perfection as to extract all the sulphur to within a small percentage. The directors believe they have one of the best mining captains in the country. He has had many years' experience in England, and more particularly for the last ten years, in the State of Vermont, where he has managed a mine of similar character with great success. His name is Thomas Pollard. There are considerable quantities of sulphur and copper ores already mined out and lying ready for sorting and delivery. Last year the company worked out (besides getting through the dead work) about 5000 tons of sulphur ore, and sold the same for about $25,000 (say, £5000), which must be considered a fair beginning.

The accommodation and buildings at the mine consist of the house at the mine, where the men are boarded, which is 40 ft. long, 20 ft. wide, and two stories high, lined with bricks, with an addition, 20 by 15 ft., one story high, used as a wash-house. A large earth cellar, near the house, for keeping meats, vegetables, &c. (The house has had as many as forty men in it, and is well built, and comfortable.) The superintendent's house, two stories high, a very good house, new, and in all respects convenient and suitable for the purpose. A stable, with room for six horses, harness, &c. A new thoroughly-built blacksmiths' shop alongside the trock at the mouth of the adit level. An office by the side of the scales where the ore is weighed. A changing-house, where the men change their working clothes for clean ones, and a substantial shed over the dump and sorting-ground. A few small houses, costing $500 each, would be very desirable as residences for married miners who have families, the boys working well as sorters of ore, and in many other ways being as useful as men, and much less expensive. The question of their erection is now under consideration. Many of the men find board with the surrounding farmers' families, and prefer living in that way. The workings are well planned and shaped. The rock stands, without timber or masonry, as firm to-day as it did three years ago.

COST, VALUE, AND PROFIT PER TON.—The net profits on the sulphur ore, now sold at $5 per ton, is about $3 per ton, thus:—Contract to miners to deliver the ore on the dump, per ton, 75 cents; sorting, per ton, 25 cents; hauling to dock, per ton, over new road, 50 cents; all incidental expenses, office, superintendent, &c., 50 cents: total, $2. Sold at the dock, per ton, $5; profit, $3 per ton. The net profit on 6 per cent. copper ore worked on the spot for metal only is estimated at $14 per ton. Many of these expenses are taken too high, and will not be materially increased whatever quantity of ore be taken out in a given time. The improvements now going on will still further reduce expenses. It must not be supposed that $5 per ton is the highest price that could be obtained for the sulphur ore. It is put at this low figure at present to encourage the manufacture of sulphuric acid therefrom.

QUANTITY OF ORE.—The mine is, properly speaking, a huge quarry of sulphur ore, actually visible, and open to the inspection of anyone. There is nothing imaginary or speculative about this. It is only as regards copper and nickel that it can be looked upon as a mine, and, therefore, upon this point only to some extent speculative. The directors base their calculations of future earnings and profits upon the actual facts and experience derived from the last six years' working, and more particularly upon that of the past year. These calculations are verified by Prof. Raymond, Mining Engineer to the United States Government, who reports that the mass of solid ore now exposed to view, and ready for breaking down and carting away for sale, amounts to at least 40,000 tons:—In the stope from the cross tunnel to bottom of the shaft (say), 16,000 tons; in the stope from the upper drift down to the large tunnel stope, 10,000 tons; in the ground south of the shaft, 14,000 tons: total, 40,000 tons of sulphur ore, in extracting which some 4000 to 5000 tons can be set aside as 6 per cent. copper ore. In the ground south-west of the shaft there are about 46,000 tons more easily to be opened up, without any dead work. There cannot reasonably be any doubt of the continuance of the deposit in depth, and there is at least 700 ft. in perpendicular height yet. Besides the deposit now worked upon there are, doubtless, parallel recurrences in the same zone. Where one rich ore-body thins out another will be found to set in, and this metalliferous series continues in the property for at least a mile, as is indicated by the outcrops traced for that distance. Hence the company can at any time open upon some other outcrop, and double the rate of production. The capacity of the mine is, therefore, practically beyond limit.

ESTIMATE OF PROFITS.—Upon the foregoing moderate calculations, there will be a net profit on the ores now in sight or available without any dead work being needed, as follows:—In tunnel stopes: sulphur ore, 35,000 tons, at $3, profit $105,000 (£21,000); copper ore, 5000 tons, at $14, profit $70,000 (£14,000) —In south-west ground: Sulphur ore, 40,000 tons, at $3, $120,000 (£24,000); copper ore, 6000 tons, at $14, profit $84,000 (£16,800): total, $379,000 (£75,800). It will probably take, with the present force of men, about three years to extract the above, but it depends entirely upon the number of men the company choose, or their finances permit, to be employed. It can be pushed ahead much faster than this. However, calculating at this slow rate, the above would give a return equal to 8½ per cent. per annum on the nominal capital of $1,500,000 (£300,000). The extraordinary shipping advantages of the company, and the great and increasing demand for the ore among acid and vitriol manufacturers, render it safe to look forward to a steady prosperity.

ASSAYS.—The company sent to London some samples of all the ores (selected promiscuously by Mr. Alfred Kimber, C.E., Associate of King's College, London, who visited the mine for the purpose) to be asssyed by Mr. Frederick Claudet, of London. These samples, rich and poor together, were analysed and reported upon by him as follows:—No. 1 samples, magnetic pyrites. No. 2 samples, copper pyrites, intermixed with magnetic pyrites. Sulphur, No. 1, 34·45; No. 2, 29·52; iron, No. 1, 51·25; No. 2, 37·56; copper, No. 1, ·83; No. 2, 8·28; nickel and traces of cobalt, No. 1, ·60; No. 2, 46; carbonate of lime, No. 1, 3·50; No. 2, 4·63; insoluble rock, No. 1, 8·40; No. 2, 18·40; moisture, No. 1, ·20; No. 2, ·20; oxygen and loss, No. 1, ·77; No. 2, ·95: total, No. 1, 100·00; No. 2, 100·00. Mr. Alfred Kimber writes that "as a pyrites mine (sulphuret of iron) it is a great success, and the quantity is inexhaustible. The samples sent may be taken as a fair test of the quality as regards the sulphur. From the appearance of the ore now coming out, the future of the mine is very good as regards copper. You cannot find a single piece of ore that does not show copper, and the quantity of rich copper ore seems to be increasing." The company had a lot of 50 tons of ore tested on July 14, 1870, by Prof. Chandler, at the School of Mines, Columbia College, New York, and received his certificate that it contained 7 60-100ths per cent. of copper.

PROSPECTS AS TO COPPER.—The miners are steadily coming to more copper, and all who see it have but one opinion, which is that it is a great copper vein. The numerous heaps of copper ore, more or less concentrated, which lie about the dumps cry aloud to be utilised, but until recently there have been no American purchasers of 3 per cent. to 7 per cent. ores of copper. Professor Raymond, before mentioned, reports that "as the work has progressed it is found that the magnetic sulphuret of iron has become purer and massive, and contains less of hornblende and felspar, while the sulphuret of copper in the stripe found in the hanging wall is richer;" and he "emphatically repeats the opinion that in depth the percentage of copper will increase. It is confirmed by the actual experience of the mine." Mr. Alfred Kimber writes "that he feels more and more convinced every time he goes to see the mine of its great future. The ore is fast approaching that point when it will be difficult to know how to sort it. The copper is more evenly distributed throughout the sulphur, and is increasing to such an extent that it will be difficult to say whether it shall be called sulphur ore, and sold at $5 per ton, or whether it would pay to sort for copper ore at $3 a unit, which for 6 per cent. copper ore at $3 a unit would give $18 per ton. The dead work to be done in the mine is positively nothing, and the ore is coming out so free from rock that it only requires sorting for copper."

The running expenses owing by the company did not exceed $8500 (1700*l*.) on Aug. 31, 1870. The money owing to the company for sulphur ore, sold and delivered, amounted to $9000 (1800*l*.) on the same date. The balance of cash in the hand of the treasurer is $2000 (£400). The company have no debts or incumbrances of any kind, with the exception of a mortgage for $5730 (£1140) remaining on the Putnam County property, which the company are ready to pay off whenever required. The fiscal year of the company ends on the second Monday in October of each year. The annual meeting of stockholders is held at the office on the fourth Monday in October of each year, at twelve o'clock. The principal office of the company is at 22, William-street, in the city of New York, where the books are kept.

A copy of the constitution and bye-laws of the company, and of the laws of the State of New York relating to the same, can be seen at the office of the company, and of Messrs. Kimber and Ellis, solicitors, 70, Lombard-street, London, by whom shares will be received and forwarded, when required, for registration. The shares are transferable by simple endorsement of the share certificates, and the holder can have his own name registered in the company's books when he pleases, on production of the certificates so endorsed.—W. KEMEYS, President; ALFRED F. KEMP, Treasurer; T. CLARKSON, Secretary.

[All the figures have been reckoned at $5 to the £1 on both sides, for convenience of calculation by English shareholders.]

A FEW SHARES IN THIS COMPANY REMAINING UNSOLD ARE TO BE OBTAINED AT £2 PER FULL PAID SHARE, ON APPLICATION TO THE BROKERS.